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MEMORANDUM FOR: Director, National Foreign Assessment Center

VIA: Deputy Director for Administration

FROM: Harry E. Fitzwater
Director of Training

SUBJECT: Training in Probability

REFERENCE: Letter to DCI from Professor Ward Edwards, dated 4 December 1978, Subject: The Use of Numerical Probabilities in Intelligence Estimates

The attached paper summarizes some activities of the Information Science Center which you may find useful in developing your response to the DCI's note concerning Professor Ward Edwards' letter.

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Harry E. Fitzwater

Attachment

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PROBABILITY TRAINING

Information Science Center
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The problem addressed in Professor Edwards' letter to the Director and the Director's response regarding the treatment of subjective probabilities in estimates reflects a chronic problem in the Intelligence Community. Approximately 10 years ago the President's Foreign Intelligence Advisory Board noted the inadequacy of the Intelligence Community's use of existing quantitative techniques in the development of intelligence estimates. Subsequently, the Information Science Center was established to provide training in applicable methodologies. The utilization of these methodologies has been relatively slow, although the attendance in Information Science courses has risen from approximately 50 students per year in 1970 to over 600 per year at the present time.

The use of quantitative values to clarify verbal statements of probability has been most advanced in the Defense Intelligence Agency. In general, although this has posed some difficulty for the analysts, the reception of Defense Intelligence Agency products with numerical probabilities has been very favorable, particularly by major commanders and the JCS. It is the opinion of Vice Admiral Robertson, USN, the Vice Director for Production, DIA, and Brigadier General Williams, USA, the Deputy Director for Estimates, DIA, that the analysts' difficulties have been ameliorated by various training programs in the use of probabilities and statistics. It has also been the experience of these senior officers that use of numerical probabilities, even in a simplistic form, encourages the analyst to think in terms of alternatives and their relative likelihoods.

Relevant Training

Subjective Probability Assessment Training (SPATr)

Numbers can serve as an objective standard to supplement the words in intelligence estimates. The problem is not in developing a technique to improve communication; we have one. The problem is to implement it. An exercise developed from a 1968 Department of Defense research program has been used by the Information Science Center in the CIA Office of Training since the early 1970s. The Subjective Probability Assessment Test (SPATe) offers students an opportunity to use numbers as a communication device and to receive feedback on how the numbers they used compare with their actual performance. Approximately 2,000 Intelligence Community analysts and managers have taken the SPATe since 1976. There is clearly room for improvement in the way analysts

use numbers to express their uncertainty. We believe it is possible to train individuals to express their probability estimates more accurately. A program for Subjective Probability Assessment Training (SPATr) on the CIA's VM system has been available for seven months.

Statistical Concepts for Analysts and Managers (SCAM)

This course was established in April 1977 at the request of DIA. It is designed to acquaint analysts with the basic concepts and application of probability and statistics. Earlier, DIA had required the use of probabilities in Defense Intelligence Estimates and in current reporting. This course was considered necessary to improve the analyst's ability to fulfill that requirement. A total of 210 students, 134 from DIA, 44 from CIA, and 32 from other agencies of the Intelligence Community, have completed the course. In addition to basic concepts of probability, the course includes such topics as Bayesian Analysis, confidence intervals, and subjective probability. Students also learn how to use computer programs to assist in problem-solving.

We have found that some people--because of mathematical background, dislike for numbers, or whatever the reason--do not do well in this course. A limited amount of pre-testing suggests that not all analysts will accept or be able to use numerical probabilities well.

The SCAM course is available on videotape.

Decision Analysis Course

The process of decision analysis involves the decomposition of a decision problem into clearly defined components so that all options, outcomes, values, and probabilities are depicted. The Information Science Center has presented short overviews of the techniques of decision analysis in several courses, and the first course devoted exclusively to this technique was presented 4-8 December 1978 at the ISC by Decisions and Designs, Inc. This course is scheduled three times yearly.

Over the past few years there have been a number of applications of decision analysis in intelligence. In the DoD, for example, it has been used to study evacuation situations, to structure Program Objectives Memoranda (POMS), and to analyze indications and warning situations. Recently, a hierarchical inference model was installed on the CIA's VM system for use by CIA analysts. Because the techniques of decision analysis provide a simple but useful framework

within which components of a decision problem can be analyzed, they can be used to both understand and communicate to others the results of analysis.

Simulation Techniques

The preceding techniques are also important because of their potential contribution in the development of simulation models. Simulation models are uniquely valuable because they can be used to quickly assess the impact of various policy alternatives. This addresses directly the nature of the problem with which Professor Edwards and Admiral Turner are dealing. Training in simulation model building, the System Dynamics course, has been presented by the ISC for five years.